Title:	Monitoring pests and diseases in gall mite and reversion-resistant blackcurrant varieties at Rosemary Farm, Ticehurst 2000
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Authentication

I declare that this work was done under my supervision according to the procedures described herein and that this report is a true and accurate record of the results obtained.

Signed……..
J. V. Cross

Dated……

Monitoring pests and diseases in gall mite and reversion-resistant blackcurrant varieties at Rosemary Farm, Ticehurst 2000

Summary

Pests and diseases were monitored in four large adjacent plots of blackcurrants at Rosemary farm, Ticehurst in 2000. The plots were:

Plots 1 and 2. Ben Gairn, Ben Hope + growers routine sprays
Plots 3 and 4. Ben Gairn, Ben Hope + Integrated Pest and Disease Management (IPDM)

- Blackcurrant aphid and to a lesser extent currant sowthistle aphid were the main pests.

- Aphid populations were much higher in the routinely-treated plots than in the IPDM plots. Meothrin failed to give control in the routinely sprayed plots whereas Aphox gave good control when aphids were first seen in the IPDM plots.

- Natural enemy populations were similar on all plots. The 22 spot ladybird was associated with aphids.

- No predatory mites, gall mite, spider mites or reversion infection were recorded.

- Mildew and leaf spot were not detected before harvest, despite prolonged searching.

- Fungicide rates were reduced to one third of those recommended by the manufacturer on the IPDM plots from May to harvest.

- No *Botrytis* was recorded on Ben Gairn and only trace amounts occurred on Ben Hope.

- Significant levels of leaf spot developed on the IPDM plots of both varieties post harvest whereas only very low levels developed on the routine plots. Both varieties were susceptible to leaf spot, but Ben Hope appeared more susceptible to than Ben Gairn.

- Both varieties appeared to be of low susceptibility to mildew.

- Monitoring for further seasons to determine longer-term effects is recommended.

Introduction

A large plantation of the gall mite resistant blackcurrant variety, Ben Hope, and of the reversion virus resistant blackcurrant variety, Ben Gairn, was planted at Rosemary farm, Ticehurst in early spring 1999. These varieties offer an opportunity to develop Integrated Pest and Disease Management (IPDM) programmes for blackcurrant and so reduce the use of pesticides on the crop significantly. In 2000, HRI were contracted

by the SmithKline Beecham/HDC research fund to monitor pest and disease levels in the plantation and to advise the grower on an appropriate IPDM programme. The results obtained are reported here.

Methods

The plantation was divided up into 4 plots. Two plots were of the gall mite resistant variety Ben Hope and two plots were of the reversion virus resistant variety Ben Gairn. One plot of each variety received an Integrated Pest and Disease Management (IPDM) programme using more selective pesticides at reduced rates only when necessary. The other received a routine programme of sprays at the full dose including of the broad-spectrum pyrethroid insecticide/acaricide fenpropathrin (Meothrin). The plantation was visited at regular intervals through the growing season by J V Cross (Entomologist) and A M Berrie (Plant Pathologist). Pest and disease levels were monitored using the methods shown in Table 1. On each occasion, 30 bushes in a transect across each plot in were examined.

Table 1. Assessment methods

Pest/disease	**Times***	**Examine**	**Record**
Aphids	1,2,3	Whole bush	No. shoots infested with each species and average no. of shoots.
Vine weevil	4,5	5 basal leaves	No. of feeding notches
Spider mite	3,4,5	2 leaves/bush	No. mites and eggs.
Predatory mites	3,4,5	2 leaves/bush	No. mites and eggs. Identify species.
Predatory insects	1-5	1 beat/bush	No. and species of predatory insects.
Predatory ground beetles	2,5	10 pitfall traps/plot with antifreeze	No. of beetles and identity of dominant species.
Slugs & snails	4,5	10 tile traps bated with methiocarb pellets/plot	No. of individuals and identity of dominant species.
Gall mite	6	Whole bush	No. of galls in dormant period.
Mildew	1-5	Whole bush	Examine terminal buds of shoots score disease according to categories in ADAS Key No. 7.2.1 (Anon., 1976)
Leaf spot	1-5	Whole bush	Percentage leaf area affected scored using method of Clarke & Corke (1956)
Botrytis	5	Four 0.5m lengths fruiting shoot/bush	No. of sporing *Botrytis* infections per shoot
Reversion infection	2	Whole bush	No. of infected flower trusses
Other pests and diseases	1-6	Whole bush	Devise appropriate sampling unit/method for particular pests and diseases.

*Key: 1=bud burst/early grape, 2=late grape, 3=post blossom, 4=June, 5=harvest, 6=dormant

The results of each assessment were reported to the grower, Peter Reeves, and appropriate treatments discussed using the methods set out in Table 2. Sprays applied are shown in Table 3.

Results

Pests and diseases were below levels of detection in March on all plots (Table 4). Spiders were the only arthropods found on the bushes and these occurred in small numbers. Small numbers of blackcurrant aphid, *Cryptomyzus galeopsidis*, were present on the lower leaves of a proportion of bushes on 10 April. The pest was recorded in greater numbers on the conventionally-sprayed plots than on the IPDM plots although no insecticide sprays had been applied to that date. Numbers remained low during April and only a small percentage of shoots were infested on 28 April with no obvious differences between plots. A spray of Aphox was applied to the IPDM plots on 15 May (Table 3). Numbers increased dramatically in early May and reached high levels on the conventional plots with 73-90% shoots infested. The lower leaves of the bushes became sticky on their upper surfaces but there was little leaf distortion. Populations were much smaller on the IPDM plots where the spray of Aphox had been applied. Infestations of the currant sowthistle aphid, *Hyperomyzus lactucae*, which causes characteristic distortion in the shoot tips developed on the Ben Gairn. The second spray of Meothrin, which had been applied to the Conventional plots on 14 May, was ineffective in controlling the aphids and heavy infestations persisted until an unscheduled spray of Aphox was applied on 11 June.

Neither leaf spot or mildew were detected on any of the plots before harvest (Table 4). This allowed substantial reductions in fungicide rates to be made for the sprays on 15 May and 11 June on the IPDM plots. No symptoms of reversion virus infection were recorded. *Botrytis* occurred at very low levels on the ripening fruits of Ben Hope just before harvest but none was detected on Ben Gairn. Leaf spot and mildew infection was first detected at very low levels on 17 August post-harvest. It had increased markedly on the IPDM plots by 25 August when 28.0 % and 12.3% of the leaf areas of Ben Hope and Ben Gairn respectively were infected by the disease. Much lower levels of infection were present on the conventional plots. However, all the plots were then sprayed with Radspor on 30 August to prevent the leafspot increasing which might have caused premature defoliation so causing a decrease in yield the following year.

Discussion

This work shows that Meothrin is ineffective against the aphids which occur on blackcurrant and that additional sprays of Aphox or of another approved aphicide are likely to be needed. There was little evidence of increases in natural enemy populations in the IPDM plots. The 22 spot ladybird, ***Psyllobora vigintiduopunctata***, was associated with the heavy infestations of the blackcurrant aphid which developed on the conventional plots. As gall mite and reversion virus were absent from the plots, no conclusions about the relative effectiveness of the IPDM and conventional programmes can be drawn at this stage. The work needs to be continued for several further seasons to see how the programmes perform in the longer term.

The very low levels of mildew and *Botrytis* that occurred, the latter disease being at near zero levels despite very wet weather throughout much of the growing period, suggest that the two varieties are of low susceptibility to these two diseases.

However, both varieties and especially Ben Hope, appear to be susceptible to leaf spot. Reducing the rate of fungicide to prevent this disease led to the development of higher levels post- harvest. As for pests, the investigation needs to be continued for several further seasons before firm conclusions can be drawn.

Acknowlegements

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References

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Table 2. Management approaches to pests and diseases

	IPDM plots		Conventional plots	
	Threshold	**Actions**	**Threshold**	**Actions**
Gall mite	Routine	Two sprays of sulphur, one at first leaf unfolding, one at first grape visible growth stages	Routine	2 sprays of sulphur at first leaf unfolding to first grape visible growth stages. Two sprays of Meothrin, one just before and one just after flowering
Aphid control	Damaging infestations present	Spray Aphox	Damaging infestations present	Spray Aphox
Caterpillars	Damaging infestations present	Spray Bacillus thuringiensis		
Leaf midge	Significant damage seen		Significant damage seen	Spray Meothrin
Leaf spot/mildew	Routine	Spray fungicides at quarter rate unless disease levels rise, then use full rate	Routine	Spray fungicides at full rate
Botrytis	Routine	Spray Elvaron at fruit set	Routine	Spray Elvaron at fruit set

Table 3. Sprays of fungicides, insecticide and foliar nutrients applied in 2000

IPM plots				Conventional plots			
Date	GS Hope, Gairn	Product	Rate	Date	GS Hope, Gairn	Product	Rate
15 March	C1, C1	Sulphur 80% FL	9.8 l/ha	15 March	C1, C1	Sulphur 80% Fl	9.8 l/ha
28 March	C3, D	Sulphur 80% FL	9.8 l/ha	28 March	C3, D	Sulphur 80% FL Karamate	9.8 l/ha 1.7 kg/ha
23 April	E2, F1	Bravo Systhane 20 Urea	2.8 l/ha 140 ml/ha 4.5 kg/ha	23 April	E2, F1	Bravo Systhane 20 Meothrin Urea	2.8 l/ha 140 ml/ha 0.7 l/ha 4.5 kg/ha
15 May	I2, I3	Aphox Bravo 500 Elvaron Systhane 20 Urea	280 g/ha 1 l/ha 350 g/ha 105 ml/ha 5.6 kg/ha	14 May	I2, I3	Bravo 500 Elvaron WG Systhane 20 Meothrin Urea	2.8 l/ha 1.1 kg/ha 330 ml/ha 0.7 l/ha 5.6 kg/ha
11 June	Green fruit	Aphox Scala Systhane 20 Urea	280 g/ha 350 ml/ha 105 ml/ha 5.6 kg/ha	11 June	Green fruit	Aphox Scala Systhane 20	200 g/ha 1.0 l/ha 330 ml/ha
30 August	Post-harvest	Radspor Urea	1.5 l/ha 5.6 kg/ha	30 August	Post-harvest	Radspor Urea	1.5 l/ha 5.6 kg/ha

Table 4. Results of pest, disease and natural enemy assessments

Date (Growth stage Ben Hope, Ben Gairn)	Ben Hope		Ben Gairn	
	IPDM	Conven-tional	IPDM	Conven-tional
14 March (GS C1, C1)				
Pests and diseases	0	0	0	0
31 March (GS C3, D)				
Pests and diseases	0	0	0	0
10 April (GS E1-2, I1)				
Blackcurrant aphid (bushes/30 infested)	6	14	8	10
Currant sowthistle aphid (bushes/30 infested)	0	0	0	1
Tarnished plant bug adults (30 beats)	1	2	1	1
Spiders (30 beats)	1	2	0	5
Other pests and disease	0	0	0	0
28 April (GS F1, F2)				
Blackcurrant aphid (shoots/150 infested)	1	1	3	1
Currant sowthistle aphid (shoots/150 infested)	0	0	2	2
Other pests and diseases, reversion	0	0	0	0
Ground beetles/10 pitfall traps	21	17	29	23
17 May (GS I2, I3)				
Blackcurrant aphid (shoots/150 infested)	3	90	7	73
% leaf with honeydew	0	30	1	20
Currant sowthistle aphid (shoots/150 infested)	0	0	1(11 dam.)	11
Permanent currant aphid	0	0	3	0
Other pests and diseases	0	0	0	0
6 June (GS Green fruit)				
Blackcurrant aphid (shoots/60 infested)	5	43	2	17
Currant sowthistle aphid (shoots/60 infested)	0	0	1	4
Red currant blister aphid (shoots/60 infested)	0	0	0	1
Vine weevil adults (/30 beats)	0	0	3	7
Common green capsid	0	1	1	0
Syrphid larvae	3	0	1	1
Soldier beetle adults	0	0	5	6
Spiders	2	5	7	6
Rove beetle adults	6	4	2	3
Ladybird adults	11	0	3	4
Anystis predatory mites	0	0	1	0
Earwig juveniles	10	2	2	1
Anthocorid/mirid predators	2	0	1	0
Other pests and diseases	0	0	0	0
30 June (GS 10-20% fruit black, 100% fruit black)				
Tydeiid mites (/60 leaves)	0	0	2	2
Other pest or predatory mites (/60 leaves)	0	0	0	0
Botrytis(infections/90 0.5m lengths of shoot)	3	3	0	0
Other pests and diseases	0	0	0	0

Table 4……..continued

Date (Growth stage Ben Hope, Ben Gairn)	Ben Hope		Ben Gairn	
	IPM	Conven-tional	IPM	Conven-tional
2 July (GS 50% fruit black, 100% fruit black)				
Slugs (/10 tile traps)	0	4	1	0
Ground beetles (/10 tile traps)	3	1	0	5
Ground beetles (/10 pitfall traps)	14	35	13	28
17 August (post harvest)				
Mildew (shoots infected/30 bushes)	3	3	1	0
Leaf spot(presence/ absence)	+	+	+	+
Other pests and diseases	0	0	0	0
25 August (post harvest)				
Leaf spot (mean % leaf area infected)	28.0	0.4	12.3	0.9
21 December (dormant)				
Gall mite galls (/200 bushes)	0	0	0	0